

What is claimed is:

1 1. A method for measuring a sense node voltage associated with a light-detecting
2 element, the sense node voltage being related to light intensity incident upon the light-
3 detecting element, comprising:

4 (a) generating a first integration reset pulse to enable a resetting of the sense node
5 voltage to a voltage value substantially equal to a reset voltage value associated with the
6 first integration reset pulse, an edge of the first integration reset pulse triggering a
7 beginning of a first integration period;

8 (b) generating a second integration reset pulse to enable a resetting of the sense
9 node voltage to a voltage value substantially equal to a reset voltage value associated with
10 the second integration reset pulse, an edge of the second integration reset pulse triggering
11 a beginning of a second integration period;

12 (c) generating, subsequent to the generation of the first integration reset pulse and
13 prior to the generation of the second integration reset pulse, a plurality of intra-period
14 reset pulses to enable resetting of the sense node voltage to a plurality of voltage values,
15 each voltage value being substantially equal to a reset voltage value associated with the
16 generated intra-period reset pulse; and

17 (d) measuring, only once during an integration period, the sense node voltage
18 generated in response to incident light intensity, the sense node voltage being measured
19 subsequent to the generation of the plurality of intra-period reset pulses and prior to the
20 generation of the second integration reset pulse.

1 2. The method as claimed in claim 1, wherein the reset voltage values associated
2 with the plurality of intra-period reset pulses are less than the reset voltage value
3 associated with the first integration reset pulse.

1 3. The method as claimed in claim 2, wherein the reset voltage value associated
2 with one of the plurality of intra-period reset pulses is less than the reset voltage value
3 associated with a previous one of the plurality of intra-period reset pulses.

1 4. The method as claimed in claim 1, wherein the generation of the plurality of
2 intra-period reset pulses is non-periodic.

1 5. The method as claimed in claim 2, wherein the generation of the plurality of
2 intra-period reset pulses is non-periodic.

1 6. The method as claimed in claim 3, wherein the generation of the plurality of
2 intra-period reset pulses is non-periodic.

1 7. The method as claimed in claim 1, wherein the generation of the plurality of
2 intra-period reset pulses is periodic.

1 8. The method as claimed in claim 2, wherein the generation of the plurality of
2 intra-period reset pulses is periodic.

1 9. The method as claimed in claim 3, wherein the generation of the plurality of
2 intra-period reset pulses is periodic.

1 10. The method as claimed in claim 1, further comprising:
2 (e) resetting a voltage level of the sense node when the voltage level of the sense
3 node is less than the voltage value associated with the generated intra-period reset pulse.

1 11. A method for measuring a sense node voltage associated with a light
2 detecting element, the sense node voltage being related to light intensity incident upon the
3 light detecting element, comprising:

4 (a) initiating an integration period for the light-detecting element;

5 (b) resetting, a plurality of times, the voltage level of the sense node after
6 initiating the integration period; and

7 (c) measuring, only once during the integration period, the sense node voltage
8 generated in response to incident light intensity, the sense node voltage being measured
9 subsequent to the plural resettings of the voltage level of the sense node and prior to
10 initiating a next integration period.

1 12. The method as claimed in claim 11, wherein the voltage levels associated
2 with the plural resettings of the voltage level of the sense node have voltage values less
3 than a voltage value used to reset the voltage level of the sense node at a beginning of the
4 integration period.

1 13. The method as claimed in claim 11, wherein a voltage level associated with
2 one of the plural resettings during the integration period is less than a voltage level
3 associated with a previous one of the plural resettings during the integration period.

1 14. The method as claimed in claim 11, wherein the plural resettings generate a
2 non-periodic pattern.

1 15. The method as claimed in claim 11, wherein the plural resettings generate a
2 periodic pattern.

1 16. A method for capturing a frame of image data associated with a scene using
2 an array of light-detecting elements, each light-detecting element having an associated
3 sense node, comprising:

4 (a) initiating an integration period for the array of light-detecting elements, the
5 integration period being associated with the frame of image data;

6 (b) generating a plurality of intra-period reset pulses during the integration period
7 such that voltage levels of the sense nodes associated with a portion of the array of light-
8 detecting elements are enabled to be set a plurality of times during the integration period;
9 and

10 (c) measuring, only once during the integration period, the voltage levels of the
11 sense nodes voltages generated in response to incident light intensities, the sense node
12 voltages being measured subsequent to a final resetting of the voltage levels of the sense
13 nodes associated with the portion of the array of light-detecting elements and prior to
14 initiating a next integration period.

1 17. The method as claimed in claim 16, wherein the voltage levels associated
2 with the plurality of intra-period reset pulses have voltage values less than a voltage value

3 used to reset the voltage levels of all the sense nodes at a beginning of the integration
4 period.

1 18. The method as claimed in claim 16, wherein a voltage level associated with
2 the plurality of intra-period reset pulses during the integration period is less than a voltage
3 level associated with a previous one of the plurality of reset pulses during the integration
4 period.

1 19. The method as claimed in claim 16, wherein the voltages levels associated
2 with the plurality of intra-period reset pulses during the integration period progressively
3 decrease during the integration period.

1 20. The method as claimed in claim 16, further comprising:

2 (d) resetting a voltage level of the sense node when the voltage level of the sense
3 node is less than the voltage value associated with the generated reset pulse.

1 21. A method for measuring a sense node voltage associated with a light
2 detecting element, the sense node voltage being related to light intensity incident upon the
3 light detecting element, comprising:

4 (a) initiating an integration period for the light-detecting element;

5 (b) resetting, a first number of times during the integration period, the voltage
6 level of the sense node after initiating the integration period; and

7 (c) measuring the sense node voltage generated in response to incident light
8 intensity, the sense node voltage being measured a second number of times during the
9 integration period, the second number of times being less than the first number of times.

1 22. The method as claimed in claim 21, wherein the voltage level associated with
2 resetting of the voltage level of the sense node has a voltage value less than a voltage
3 value used to reset the voltage level of the sense node at a beginning of the integration
4 period.

1 23. The method as claimed in claim 21, wherein the first number of times is
2 greater than one and wherein a voltage level associated with one of the plural resettings

3 during the integration period is less than a voltage level associated with a previous one of
4 the plural resettings during the integration period.

1 24. A method for measuring a sense node voltage associated with a light-
2 detecting element, the sense node voltage being related to light intensity incident upon the
3 light-detecting element, the light-detecting element having a reset switch associated
4 therewith so as to set a voltage level of the sense node, comprising:

5 (a) generating a first integration reset pulse to enable a resetting of the sense node
6 voltage to a voltage value substantially equal to a reset voltage value associated with the
7 first integration reset pulse, an edge of the first integration reset pulse triggering a
8 beginning of a first integration period;

9 (b) generating a second integration reset pulse to enable a resetting of the sense
10 node voltage to a voltage value substantially equal to a reset voltage value associated with
11 the second integration reset pulse, an edge of the second integration reset pulse triggering
12 a beginning of a second integration period;

13 (c) generating, subsequent to the generation of the first integration reset pulse and
14 prior to the generation of the second integration reset pulse, a train of progressively
15 decreasing intra-period reset pulses to enable resetting of the sense node voltage to a
16 plurality of voltage values, each voltage value being substantially equal to a reset voltage
17 value associated with the generated intra-period reset pulse; and

18 (d) measuring, only once during an integration period, the sense node voltage
19 generated in response to incident light intensity, the sense node voltage being measured
20 subsequent to the generation of the train of progressively decreasing intra-period reset
21 pulses and prior to the generation of the second integration reset pulse.

1 25. The method as claimed in claim 24, wherein the train of progressively
2 decreasing intra-period reset pulses progressively decreases in pulse width.

1 26. The method as claimed in claim 24, wherein the train of progressively
2 decreasing intra-period reset pulses progressively decreases in voltage level.

1 27. The method as claimed in claim 25, wherein the train of progressively
2 decreasing intra-period reset pulses progressively decreases in voltage level.

1 28. The method as claimed in claim 24, wherein the train of progressively
2 decreasing intra-period reset pulses represents a non-periodic pattern.

1 29. The method as claimed in claim 24, wherein the train of progressively
2 decreasing intra-period reset pulses represents a periodic pattern.

1 30. The method as claimed in claim 24, further comprising:

2 (e) resetting a voltage level of the sense node when the voltage level of the
3 sense node is less than the voltage value associated with the generated intra-period reset
4 pulse.

1 31. A method for measuring a sense node voltage associated with a light-
2 detecting element, the sense node voltage being related to light intensity incident upon the
3 light-detecting element, comprising:

4 (a) generating a first integration reset pulse to enable a resetting of the sense node
5 voltage to a voltage value substantially equal to a reset voltage value associated with the
6 first integration reset pulse, an edge of the first integration reset pulse triggering a
7 beginning of a first integration period;

8 (b) generating a second integration reset pulse to enable a resetting of the sense
9 node voltage to a voltage value substantially equal to a reset voltage value associated with
10 the second integration reset pulse, an edge of the second integration reset pulse triggering
11 a beginning of a second integration period;

12 (c) generating, subsequent to the generation of the first integration reset pulse and
13 prior to the generation of the second integration reset pulse, a plurality of intra-period
14 reset pulses to selectively reset the sense node voltage to a plurality of voltage values,
15 each voltage value being substantially equal to a reset voltage value associated with the
16 generated intra-period reset pulse; and

17 (d) measuring, only once during an integration period, the sense node voltage
18 generated in response to incident light intensity, the sense node voltage being measured

19 subsequent to the generation of the plurality of intra-period reset pulses and prior to the
20 generation of the second integration reset pulse.

1 32. The method as claimed in claim 31, wherein the reset voltage values
2 associated with the plurality of intra-period reset pulses are less than the reset voltage
3 value associated with the first integration reset pulse.

1 33. The method as claimed in claim 32, wherein the reset voltage value
2 associated with one of the plurality of intra-period reset pulses is less than the reset
3 voltage value associated with a previous one of the plurality of intra-period reset pulses.

1 34. The method as claimed in claim 31, wherein the generation of the plurality of
2 intra-period reset pulses is non-periodic.

1 35. The method as claimed in claim 32, wherein the generation of the plurality of
2 intra-period reset pulses is non-periodic.

1 36. The method as claimed in claim 33, wherein the generation of the plurality of
2 intra-period reset pulses is non-periodic.

1 37. The method as claimed in claim 31, wherein the generation of the plurality of
2 intra-period reset pulses is periodic.

1 38. The method as claimed in claim 32, wherein the generation of the plurality of
2 intra-period reset pulses is periodic.

1 39. The method as claimed in claim 33, wherein the generation of the plurality of
2 intra-period reset pulses is periodic.

1 40. The method as claimed in claim 31, wherein the voltage level of the sense
2 node is reset when the voltage level of the sense node is less than the voltage value
3 associated with the generated intra-period reset pulse.